

REMARKS

As a preliminary, Applicant and Applicant's representative thank the Examiner for the telephonic interview of June 14, 2007.

The following points were discussed during the interview:

- Inquiry of Examiner's requirements for inventor's declaration and priority claim;
- Explanation of the "amplitude E" and "mean variation L' of gear ratio L" for an operating stage in the present invention;
- Discussion of requirements for patentable subject matter, utility and enablement;
- Distinction of invention from systems with fixed gear ratio during permanent stages of Osanai and Nakawaki references.

In the method of the presently claimed invention, as recited in claim 1, the engine speed is controlled with a permanent mode such that the mean variation per unit time ( $L'$ ) of the gear ratio ( $L$ ) lies between a first threshold value ( $S_1$ ) that is negative and a second threshold value ( $S_2$ ) that is positive, whereas, in the transient mode, the mean variation per unit time ( $L'$ ) lies outside that range. In this manner, it is possible to control the variation of the speed ratio to "imitate" to some extent a manual gear box, such as avoiding sudden engine noise and/or transmission sliding effect during the permanent mode (because of the limits to the setting of the mean variation  $L'$ ), as well as simulating gear changes through the alternation of permanent and transient modes, while still benefiting to some extent from the advantages of a continuously variable transmission (i.e., especially since the mean variation  $L'$  allows for an adjustment of the

gear ratio even during the permanent mode). Such characteristics are apparent in the embodiment illustrated on Fig. 2 of the present specification. Thus, the present invention makes it possible to adjust the engine speed and gear ratio to the required output and fuel economy so as to benefit from the continuously variable transmission, while still producing a noise variation familiar to a driver who is used to a manual gear box, i.e., in particular, with relatively stable permanent modes (mean variation per unit time  $L'$  in range defined by thresholds) and intermediary transient modes (mean variation per unit time  $L'$  outside of range).

By the present amendment, the following changes are submitted.

The specification has been amended to introduce section titles and a brief description of the figures, and the title has been amended.

Further, claim 1 has been corrected by reciting “rotation” instead of “ration” and “ $\omega$ ” instead of “w,” and the specification has been corrected accordingly. Also, claim 1 has been amended to use consistent terminology “mean variation per unit time” for  $L'$  (as recited in claim 14) instead of “sliding average,” and the specification has been amended accordingly.

Further, claim 1 has been amended to recite that the mean variation per unit time ( $L'$ ) is set with an absolute value of more than zero for the duration of at least a portion of the permanent mode. Support is immediately derived from the original application, for example, from Fig. 2 and the corresponding description.

Claim 14 has been corrected to be dependent on claim 1 instead of claim 9.

Claim 15 has been amended to replace “rpm” by the correct unit “km/h per 1000 rpm” for the amplitude E, and the specification has been amended accordingly.

Claims 1-18 are pending in this application. Claim 1 is the only independent claim.

As a preliminary, in the Office Action, it is alleged that a certified copy of the priority document (FR 0301273) has not been received in this application, and that the inventors’ declaration lacks proper identification of the application by application number and filing date.

Applicant submits that (i) the priority document was submitted in the international stage of this international application and transmitted to the U.S. Patent and Trademark Office by the International Bureau, and (ii) a declaration under 37 C.F.R. 1.68 and MPEP 602.II was properly filed attached to the national stage application to which it refers (37 C.F.R. 1.63 and MPEP 602.VI). Further, receipt of both documents is acknowledged in the notice of acceptance. Accordingly, it is submitted that the objections should be withdrawn.

Next, in the Office Action, the specification is objected to as lacking a brief description of the figures and a title that is descriptive, and claim 1 is objected to for typographical errors (“ration ( $\omega$ )” instead of “rotation ( $\omega$ )” and “(P1, V, w)” instead of (P1, V,  $\omega$ )), and the claims are also objected to as showing deficient print quality and line spacing.

The specification has been amended to introduce section titles and a brief description of the figures, and the title has been amended as suggested in the Office Action, except that the phrase “for adapting its noise characteristics with permanent and transient modes” is used in the title instead of “for noise reduction.”

Further, claim 1 has been corrected as suggested in the Office Action by reciting “rotation” instead of “ration” and “ $\omega$ ” instead of “w,” and the specification has been corrected accordingly at page 3, lines 2-3. Any line spacing and print quality objection to the original claims is absent in the current version of the claims in the present amendment.

In view of the above, it is submitted that the objections should be withdrawn.

Next, in the Office Action, claims 1-18 are rejected under 35 U.S.C. 101 as lacking utility. It is alleged that the “function of control of the engine output shaft rpm value based on estimated values is unknown” and that the invention cannot be understood because the “moving average of the gear ratio” is unitless whereas the threshold values to which it is compared in the specification are in “km/h per 1000 rpm” (Office Action at page 4, last paragraph).

Reconsideration and withdrawal of the rejection is respectfully requested. As discussed at the interview, it is submitted that the method of the invention relates to adjusting the value of the gear ratio of the CVT. The gear ratio  $L$  is related to a ratio of the wheel speed measured, for example, in km/h, by an engine speed, which is measured, for example, in 1000 rpm, hence the measuring unit of “km/h per 1000 rpm” for the gear ratio. Further, the mean variation per unit time  $L'$  of the gear ratio can be measured, for example, in km/h per 1000 rpm per second, as in the numerical values of the first and second threshold values recited in claim 3.

According to the invention, the mean variation of the gear ratio is set within parameters  $S1$  and  $S2$  for each permanent stage, while the gear ratio variation is outside the range  $[S1-S2]$  during the transition stages. As a result, the gear ratio variation is controlled to “imitate” to

some extent the operation of a manual gear box, while still benefiting from the advantages of a CVT.

Operation of a CVT in accordance with a particular embodiment the present invention is illustrated on Figure 2. Thus, it is submitted that the person of the art would understand the operation and advantages of the presently claimed invention independently from specific numerical values, and in particular that the threshold values may be selected appropriately for each particular embodiment of the invention. As a result, the presently claimed invention has a specific, substantial, and credible utility.

In view of the above, it is submitted that the rejection should be withdrawn.

Next, in the Office Action, claims 4-6 are rejected under 35 U.S.C. 101 as being directed to non-patentable subject matter. It is alleged in the Office Action that the invention “claims a duration, and is a mathematical rule that describes a natural occurring phenomenon” (Office Action at page 5, second paragraph).

The rejection is respectfully traversed. It is submitted that the recitation “correcting the value of the speed of rotation” in is a positive and active method step that has the “real world” result of modifying the action of the transmission and the noise characteristics of the engine. This result is present whatever the numerical value of the thresholds S1 and S2. In other words, the “durations” of the permanent and transition stages defined in the claims are not exclusively the object of a mathematical rule, but they are parameters of the recited method steps for controlling the engine speed.

In view of the above, it is submitted that the rejection should be withdrawn.

Next, in the Office Action, claims 1-18 are rejected under 35 U.S.C. 112, first paragraph, as lacking utility.

Also, in the Office Action, claims 1-18 are rejected under 35 U.S.C. 112, first paragraph, as not enabled. It is alleged that the “threshold values” of claim 3 are essential elements which are missing in claims 1 and 2, otherwise any value would be acceptable and the transient mode would be impossible to use.

Also, claims 17-18 are rejected under 35 U.S.C. 112, first paragraph, as not enabled with respect to the slope estimation. The Examiner takes the position that “a detailed explanation of slope estimation as intended for this invention is necessary for enablement” (Office Action at page 6, second paragraph).

The rejection is also respectfully traversed. As discussed above, it is submitted that the threshold values are defined in the present claims such that the mean variation per unit time  $L'$  is set in the range  $S1-S2$  during the permanent stages (corresponding to a relatively moderate rate of variation of the gear ratio, so as to “imitate” to some extent a set gear ratio of a manual gear box while still providing a gear ratio adjustment capability) and  $L'$  is set outside the range  $S1-S2$  during the transient stages (corresponding to a relatively quick variation of the gear ratio, to “imitate” to some extent gear-changing of a manual gear box). Further, the value of the mean variation per unit time  $L'$  is set for each permanent stage so that the variation of the gear ratio can be controlled. This is illustrated for a particular embodiment on Figure 2 (the straight line in

each permanent stage corresponds to the gear ratio having a set mean variation per unit time L' during that permanent stage).

In summary, an objective of the invention is not linked to specific threshold values, but resides in the correction of the rotation speed by controlling the mean variation of the gear ratio in (permanent mode) or outside (transient mode) of a range defined by thresholds.

Further, regarding claims 17-18, it is submitted that slope variation calculation is within the purview of a person of ordinary skill. The specification states that "any suitable computation means" (page 7, line 1). For example, U. S. Patent No. 5,925,087 of July 20, 1999 shows that slope variation is easy to determine for a person of ordinary skill in the art.

In view of the above, it is submitted that the rejections should be withdrawn.

Next, in the Office Action, claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as indefinite.

With respect to claims 1, 3-7, and 10-15, it is alleged that the expressions "threshold value," "estimating the value," "lies outside the range," and "substantially equal to" are relative terms which should be defined more precisely, for example, with criteria on how to select these values.

With respect to claims 14-15, it is alleged that the expressions "said range of predetermined amplitude (E)" and "said amplitude (E) is substantially equal to 50 rpm" conflict with the expression "gear ratio (L) is limited at each instant to lie within a range of values" as the ratio is unitless whereas the gear ratio is in km/h per 1000 rpm.

Reconsideration and withdrawal of the rejection is respectfully requested.

Regarding claims 1, 3-7, and 10-15, as discussed above, it is submitted that the gist of the invention relies specifically on steps of correcting the rotation speed of the engine with the mean variation per unit time  $L'$  within or outside a range defined by thresholds, depending on the permanent or transient mode, but is not linked exclusively to specific numerical values of thresholds. In other words, suitable thresholds may be chosen by the person of the art based on the guidance and illustration in the present application.

Regarding claims 14-15, the unit for the amplitude (E) has been corrected to be km/h per 1000 rpm, as pointed out in the Office Action. Indeed, E corresponds in some embodiments to an acceptable range for the difference between the actual speed ratio  $L$  at an instant  $t_i$  (on a curved line as illustrated in the embodiment of Fig. 2) and the setpoint speed ratio at the instant  $t_i$  (on a straight line as illustrated in the embodiment of Fig. 2) calculated based on the actual speed ratio at instant  $t_0$  of the operating stage and the mean variation per unit time  $L'$  for this operating stage, which is set during the whole operating stage).

In view of the above, it is submitted that the rejections should be withdrawn.

Next, in the Office Action, claims 1-2, 4-9, and 14-15 are rejected under 35 U.S.C. 102(b) as anticipated by US 4,704,683 to Osanai ("Osanai").

Reconsideration and withdrawal of the rejection is respectfully requested. Osanai discloses a stepped gear ratio with fixed gear ratio during permanent phases and rapidly changing gear ratio during transition phases, as illustrated on Figure 2 of Osanai. This is



particularly visible by the second curve from the top on Fig. 2 of Osanai, which shows a “speed ratio” curve (corresponding to a curve as illustrated in the embodiment of Fig. 2 for the present invention). Namely, in Osanai, the permanent modes are the periods with the horizontal lines (no adjustment of the speed ratio, i.e., this corresponds precisely to the fixed gear ratio of a manual gear box) and the transient modes are the periods with the steep lines (quick change in the speed ratio).

In contrast, in the presently claimed invention, the permanent mode is such that the mean variation per unit time ( $L'$ ) lies between a first threshold value ( $S_1$ ) that is negative and a second threshold value ( $S_2$ ) that is positive, wherein the mean variation per unit time ( $L'$ ) is set with an absolute value of more than zero for the duration of at least a portion of the permanent mode, as recited in present claim 1. An advantage of this feature is that it is possible to control the variation of the speed ratio to “imitate” to some extent a manual gear box, such as by avoiding sudden engine noise or transmission sliding effect during the permanent mode (because of the limits to the setting of the mean variation per unit time  $L'$ ), while still benefiting from the continuously variable transmission (i.e., especially while the mean variation per unit time  $L'$  is set at a value different from zero). In other words, avoiding a fixed gear ratio during at least a portion of a permanent operating stage makes it possible to adapt the engine speed and gear ratio more finely to the required output and fuel economy, while still producing a noise variation characteristic familiar to a driver who is used to a manual gear box. This feature of the presently

claimed invention and its advantages are not taught or suggested in Osanai. Therefore, the present claims are not anticipated by, and no obvious over, Osanai.

In view of the above, it is submitted that the rejection should be withdrawn.

Next, in the Office Action, claims 1-3 are rejected under 35 U.S.C. 102(b) as anticipated by US 4,836,056 to Nakawaki et al. ("Nakawaki").

Reconsideration and withdrawal of the rejection is respectfully traversed. Similarly to Osanai, Nakawaki discloses a stepped gear ratio control with fixed gear ratio during permanent modes, as shown on Figures 7-9 of Nakawaki (horizontal speed ratio line during permanent stages). Specifically, Figure 8 of Nakawaki shows the art prior to Nakawaki, while Figures 7 and 9 of Nakawaki show the system of Nakawaki. However, all these control systems are similar in the sense that the gear ratios are fixed (shown as areas on Figure 7 and as the straight lines r1, r2, and r3 on Figures 8 and 9). Thus, as discussed above with respect to Osanai, Nakawaki fails to teach or suggest the features of the presently claimed invention and their advantages. Therefore, the present claims are not anticipated by, and no obvious over, Nakawaki.

In view of the above, it is submitted that the rejection should be withdrawn.

Next, in the Office Action, claims 10-13 are rejected under 35 U.S.C. 103(a) as obvious over Osanai in view of Nakawaki, and claim 16 is also rejected under 35 U.S.C. 103(a) [the Office Action refers to section 102(b) but this is believed to be a typographical error] as obvious over Osanai in view of Nakawaki.

Reconsideration and withdrawal of the rejections are respectfully traversed. It is submitted that Osanai and Nakawaki fail to teach or suggest the features of the presently claimed invention, as discussed above. Therefore, present claims 10-13 and 16 are not obvious over Osanai and Nakawaki taken alone or in any combination.

In view of the above, it is submitted that the rejections should be withdrawn.

Next, in the Office Action, claims 17-18 are rejected under 35 U.S.C. 103(a) as obvious over Osanai in view of FR 3,789,683 to Guichard et al. ("Guichard").

Reconsideration and withdrawal of the rejection is respectfully requested. Osanai fails to teach or suggest the features of the presently claimed invention, as discussed above in details, and Guichard fails to remedy these deficiencies. Therefore, present claims 17-18 are not obvious over Osanai and Guichard taken alone or in any combination.

In view of the above, it is submitted that the rejection should be withdrawn.

In conclusion, the invention as presently claimed is patentable. It is believed that the claims are in allowable condition and a notice to that effect is earnestly requested.

In the event there is, in the Examiner's opinion, any outstanding issue and such issue may be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

Amendment  
U.S. Appl. No. **10/538,172**  
Attorney Docket No. **052598**

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of the response period. Please charge the fee for such extension and any other fees which may be required to our Deposit Account No. 502759.

Respectfully submitted,

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